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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,272	04/08/2004	Tatsuo Suemasu	105-63 DIV	8591

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/820,272	SUEMASU ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-11,13-18 and 20-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-11,13-18 and 20-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 12, 2008 has been entered.

The amendment filed December 12, 2008 with the RCE submission has been received and entered. With the entry of the amendment, claims 1-8, 12 and 19 are canceled, and claims 9-11, 13-18 and 20-22 are pending for examination.

Terminal Disclaimer

2. The terminal disclaimer filed on December 12, 2008 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on application number 11/739,575 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Double Patenting

3. The provisional rejection of claims 9-15 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 4-7, 10, 12 and 13 of copending Application No. 11/739,575 is withdrawn due to the filing of an acceptable terminal disclaimer as discussed in the ***Terminal Disclaimer*** section above.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 9-11, 14-18 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneble, Jr. et al (US 3628999) in view of Locke et al (US 5425751).

Claims 9, 16: Schneble teaches a metal filling method. Column 4, lines 40-75. A hole is formed in a work piece extending from a first surface towards and opposite surface of a work piece. Column 4, lines 55-60 (holes 28) and figure 1E. The hole extends "into" base 10, and is not required to pass entirely through the substrate (base). Column 4, lines 55-50 and Figure 1. Then a metal layer is formed on at least an inner surface of one end of the hole adjacent the first surface of the work piece. Column 4, lines 55-65 (deposit 30) and figure 1F. The metal layer is also formed on a portion of the first surface of the work piece adjacent the hole, and thus is directly adhered to the first surface of the work piece adjacent the hole. Column 4, lines 60-70, column 5, lines 5-15 and figure 1F (land 32 on the top of mask layer 26 of the work piece, note that the hole is formed in a "work piece" that has base 10 and layers 22, 24, 26 as shown in figure 1E, and thus the top of mask layer 26 is the "first surface" of the work piece; to which the metal layer is directly adhered to (stuck fast or attached) until the layer 26 is actually removed as in figure 1G, column 4, lines 65-70). Then a third step of filling a molten metal into the fine hole is provided. Column 4, lines 65-75, column 5, lines 25-30 (solder would be metal) and Figure 1H (see 34). These form conductive passageways (connectors). Column 2, lines 40-50.

Claim 10, 17: the hole is filled by immersing the work piece in molten metal. Column 2, lines 1-10, column 4, lines 65-75, column 5, lines 20-60 (dipping in a molten solder bath).

Claims 14, 15, 21, 22: the solder metal comprises an external section which protrudes from the first surface of the work piece, forming a "bump" shape. Figure 1H and column 4, lines 70-75.

Schneble teaches all the features of these claims except (1) solidifying the metal (claim 9, 11, 16, 18), (2) removing part of the work piece to expose the solidified metal through the opposite side of the work piece (claim 9), (3) that the hole is a through hole that extends through the work piece (claim 16), (4) that the metal filling method further comprises closing the opening of the through holes and then opening the closed opening (claim 16), (5) and the closing of the opening using sealing material (claim 20).

Locke teaches that it is well known to provide connector through holes in an article where the holes are to be filled with metal. Column 4, lines 5-20. Locke teaches that it is known to form the connectors by providing a via or hole 82 that extends partially into a substrate (layer 80) of a work piece. Figure 6a and column 8, lines 20-30. Then the hole is plated to fill with conductor metals. Figure 6b and column 8, lines 25-35. Then the substrate 80 is partially removed to expose the metal in the hole by a process such as etching. Figure 6c and column 8, lines 35-40. Solder can be plated into the holes. Column 8, lines 40-45. Locke also teaches that it is known to form the connectors by providing a through hole 58 through a substrate (sheet 56) and to

close/block/seal the hole using a layer 54 (copper foil). Figure 5a and column 7, lines 40-47. Then the hole is plated to fill with conductor metals. Column 7, lines 45-55 and figure 5b. Then the layer 54 is removed to expose the metal through the opening of the through hole. Figure 5c and column 7, lines 54-60.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Schneble to remove the work piece from the molten metal bath and solidify the molten metal, in order to have a desirable treated circuit board for use, because Schneble teaches the formation of circuit boards, to dip the work piece in molten solder, and demonstrates the result of a plated article, indicating that the article must be removed from the molten solder bath for final use and furthermore the molten solder would solidify after removed from the bath, because it was no longer heated. (2) It further would have been obvious to modify Schneble to remove part of the work piece to expose the solidified metal through to the opposite side of the work piece as suggested by Locke in order to provide a desirable connector, because Schneble teaches to provide holes into the substrate to be filled with metal to form connectors and Locke teaches that when providing connector holes, it is known to provide them into a substrate of a work piece and then, after filling, to removing the substrate area to expose the connector to provide a connector through the entire work piece. (3) (4) (5) It further would have been obvious to modify Scheble to provide a through hole that extends through the entire work piece but is blocked by a sealing layer (closing one side of the opening) to allow desirable filling and then to open the closed opening by

removing the sealing layer as suggested by Locke in order to provide desirable connectors, because Schneble teaches to provide through holes into the substrate and Locke teaches that when providing connector holes, it is known to provide them as a through hole that extends through the entire work piece but is blocked by a sealing layer (closing one side of the opening) to allow desirable filling, and then to open the closed opening by removing the sealing layer. It would have been obvious to that the sealing layer would be provided either before or after hole formation with an expectation of equivalent results as long as it was provided before the filling of the holes, because the purpose of the sealing layer is to block the opening during filling. Also note In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results) (MPEP 2144.04. IV. C).

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schneble in view of Locke as applied to claims 9-11, 14-18 and 20-22 above, and further in view of Chang et al (US 5753529).

Schneble in view of Locke teaches all the features of this claim except removing the part of the work piece by polishing.

However, Chang teaches at it is well known to remove portions of a work piece to expose filled holes passing partway through the substrate (figures 6, 7) by either grinding, etching or CMP (chemical-mechanical polishing). Column 6, lines 9-25.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schneble in view of Locke to remove the portion of the work piece by polishing as suggested by Chang with an expectation of desirable removal results, as Schneble in view of Locke teaches to remove a portion of the work piece by etching, and Chang teaches that as well as etching, polishing methods can be desirably used to remove a portion of a work piece to expose filled holes.

Response to Arguments

8. Applicant's arguments filed December 12, 2008 have been fully considered but they are not persuasive.

Applicant argues that Schneble does not provide that the metal layer is directly adhered to the first surface of the work piece adjacent the non-through hole as is now claimed, as the flanged portions of metal 30 (land 32) shown in figure 1F, for example, is tentatively adhered to strippable temporary mask 26, etc. and are not directly adhered to their respective base surfaces (i.e. work piece surfaces); and thus the references do not provide the claimed features of the invention.

The Examiner has reviewed these arguments, however, the rejection is maintained. Applicant appears to be arguing that the "work piece" would be only the base substrate on an article being worked on. The Examiner disagrees. As discussed in MPEP 2111.01 (I):

> During examination, the claims must be interpreted as broadly as their terms reasonably allow. In re American Academy of Science Tech Center, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004) (The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation >in light of the specification<.). This means that the words of the claim must be given their plain meaning unless **>the plain meaning is inconsistent with< the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

The "plain meaning" (ordinary and customary meaning of the claim term, as discussed in MPEP 211.01 (III)) of "work piece" would be the entirety of the article being worked on at the point of time described (note for example, Webster's Ninth New Collegiate Dictionary definition, "a piece of work in the process of manufacture", with "work" including the definition "10: the material or piece of material that is operated upon at any stage in the process of manufacture"). In other words, the "work piece" of Schneble, at the time of forming the hole, is as shown in figures 1D and 1E – an article made up of base 10 and layers 22, 24 and 26. The first surface will thus be the top of layer 26. Even though mask layer 26 will later be removed, the work piece at the time that the hole is formed includes layer 26. Similarly, at the time that the metal layer is formed on the hole and the portion of the first surface of the work piece adjacent the hole, the top of mask layer 26 will be the first surface of the work piece as shown in figure 1F. While the adherence may be "tentative" as the layer 26 is later removed, it is still adhered to the first surface of the work piece as required. Therefore, Scheble provides the required feature. This "plain meaning" is not inconsistent with the specification, as applicant provides no express, differing definition of "work piece" and

further actually shows applying the metal layer on a substrate 10 that already has a layer 12 attached (see figures 2, 3, 4 and page 13, lines 5-7 and page 13, last two lines through page 14, line 3 of the present specification).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1792